L2 SST and Cloud-cleared Radiance Validation

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Objective:

Determine accuracy of L2 Products through

comparisons with surface marine data

Assumption: L2 working

Approach similar to that used for early L1B radiance evaluation (see presentation for L1B sanity check)

Comparisons carried out for team exercise simulations 09-13-98 and 12-15-00, in tropical, semi-tropical Pacific region

Cloud-cleared window radiances adjusted to surface for transmission and surface emissivity effects

Difference statistics from surface marine observations generated for (1) L2 SST and (2) cloud-cleared radiances

Cloud-cleared Radiance Validation

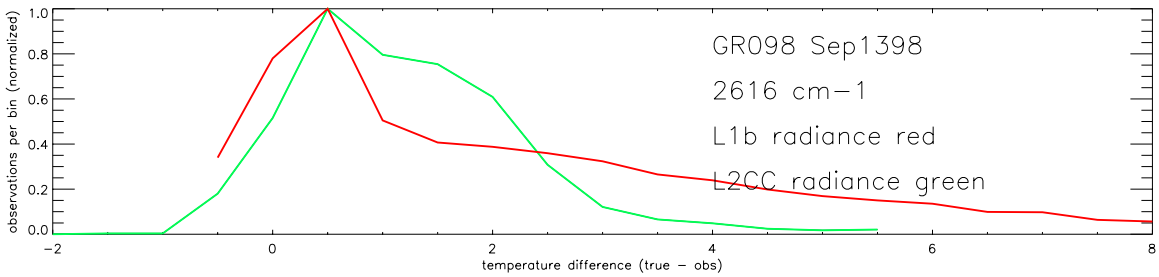
Results using simulation data from the team exercise show:

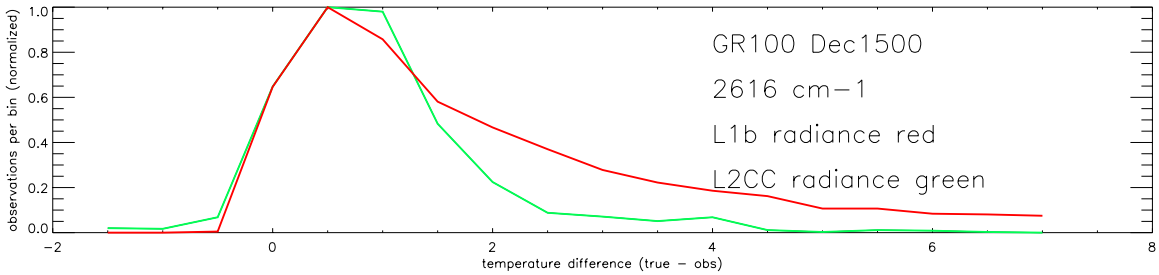
Similar modes in cloud-cleared radiance and L1B radiance

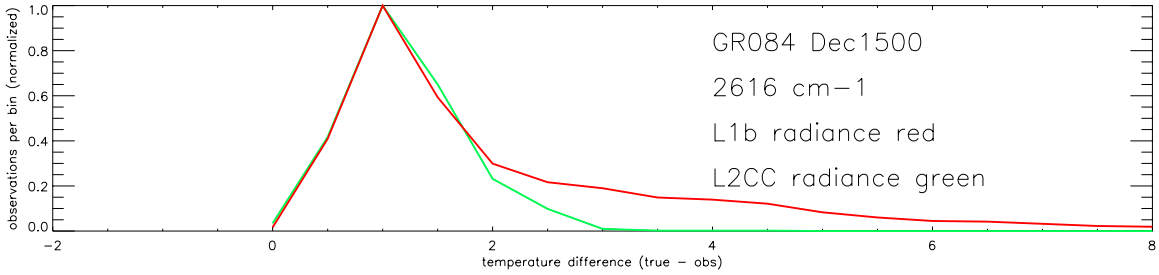
Cloud clearing works well in some granules (e.g. produces near Gaussian distribution with few outliers)

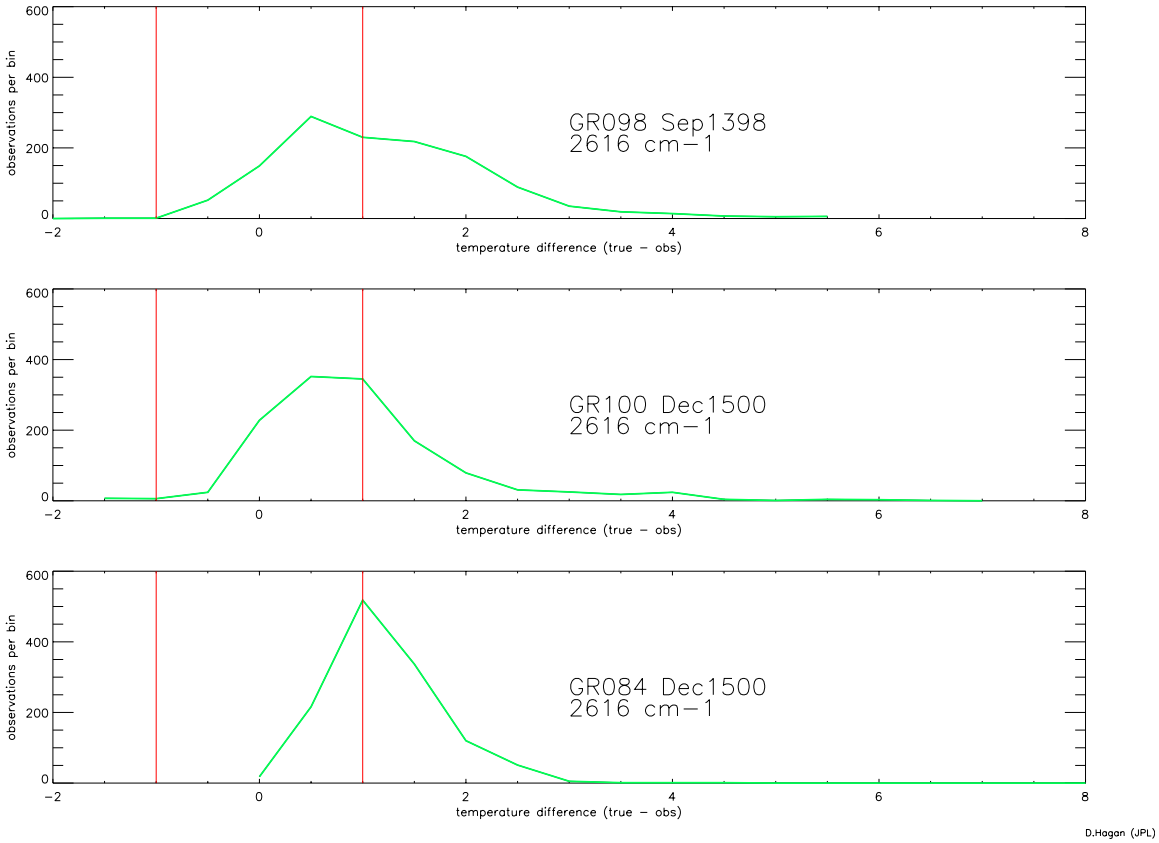
In other cases, 'long tails' retained in cloud cleared product, similar to L1B

Useable pixels typically increase from 20% to 80% of granule


observations per bin (normalized)
1.0
0.8
0.6
0.4
0.2
0.0
−2
0
2
4
6
8
temperature difference (true − obs)
GR098 Sep1398
2616 cm−1
L1b radiance red
L2CC radiance green


observations per bin (normalized)
1.0
0.8
0.6
0.4
0.2
0.0
−2
0
2
4
6
8
temperature difference (true − obs)
GR100 Dec1500
2616 cm−1
L1b radiance red
L2CC radiance green


observations per bin (normalized)
1.0
0.8
0.6
0.4
0.2
0.0
−2
0
2
4
6
8
temperature difference (true − obs)
GR084 Dec1500
2616 cm−1
L1b radiance red
L2CC radiance green


observations per bin
600
400
200
0
−2
0
2
4
6
8
temperature difference (true − obs)
GR098 Sep1398
2616 cm−1
GR100 Dec1500
2616 cm−1
GR084 Dec1500
2616 cm−1
D.Hagan (JPL)

Cloud-cleared Radiance Validation

From the Figures we conclude that:

A small shift of the mode away from zero (in many granules) is evidence for under-correction or over-correction in the CC algorithm.

The presence of tails larger than 1K is indicative of failure in the cloud-clearing algorithm.

L2 SST Validation

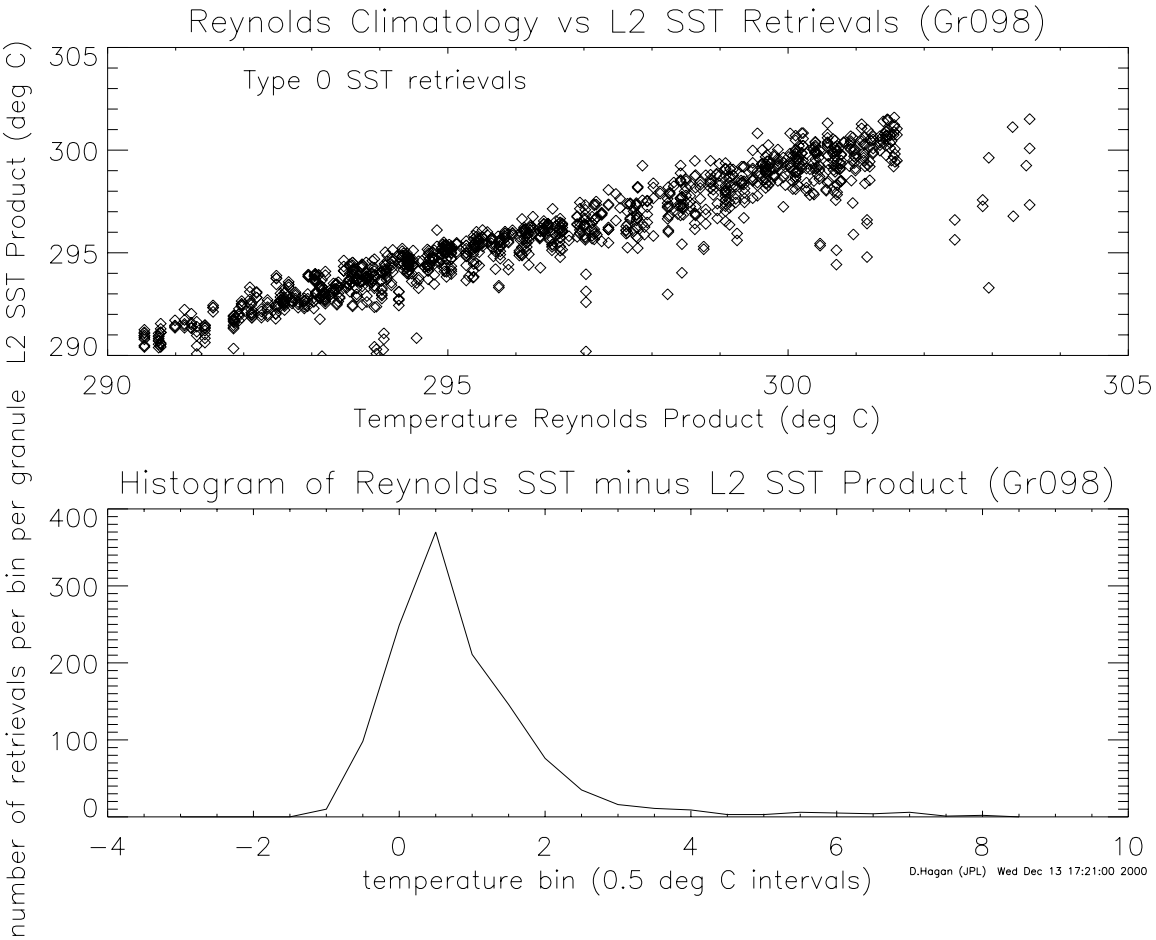
Results using simulation data from the team exercise show:

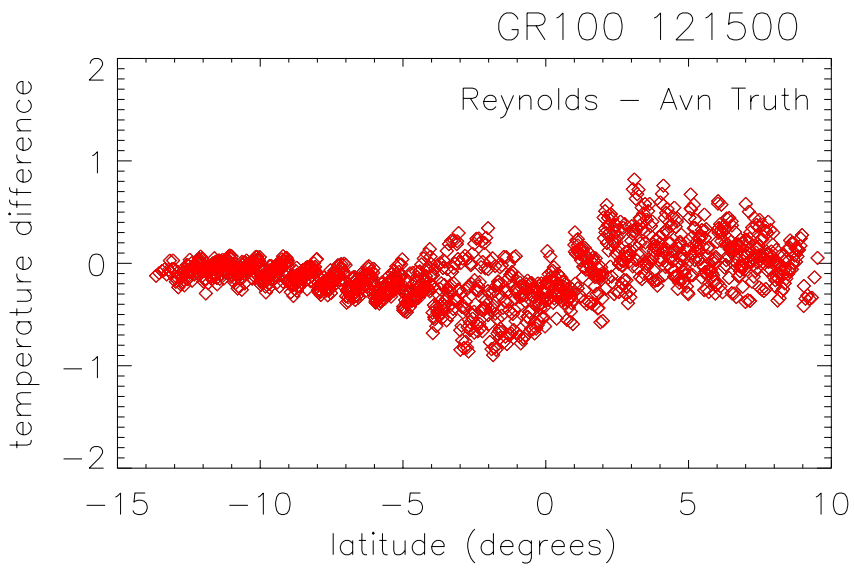
"Truth" sources differ ±0.5 K typically

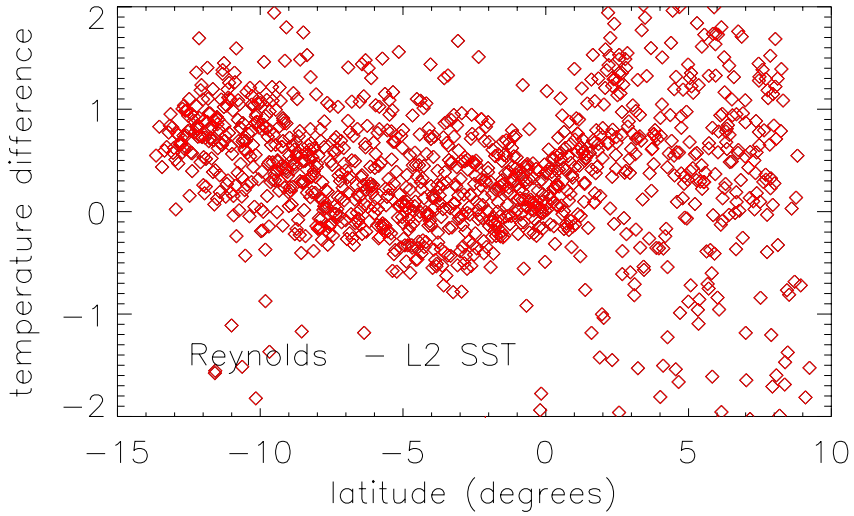
In simulations, L2 SST biased 'cool' relative to truth

The bias in the derived SST is consistent with the bias in the L2 Cloud-cleared radiances.

L2 SST variability and bias increase with increasing temperature (e.g. atmospheric moisture)


Reynolds Climatology vs L2 SST Retrievals (Gr098)
Type 0 SST retrievals
L2 SST Product (deg C)
305
300
295
290
290
295
300
305
Temperature Reynolds Product (deg C)
Histogram of Reynolds SST minus L2 SST Product (Gr098)
number of retrievals per bin per granule
400
300
200
100
0
−4
−2
0
2
4
6
8
10
temperature bin (0.5 deg C intervals)
D.Hagan (JPL) Wed Dec 13 17:21:00 2000


GR100 121500
Reynolds − Avn Truth
temperature difference
latitude (degrees)
2
1
0
−1
−2
−15
−10
−5
0
5
10


Reynolds − L2 SST
temperature difference
latitude (degrees)
2
1
0
−1
−2
−15
−10
−5
0
5
10

L2 SST Validation

From the Figures we conclude that:

The bias in the LS SST likely has the same origin as the bias in the L2 cloud-cleared radiance.

The presence of long tails in the histograms is indicative of failure in the cloud-clearing algorithm.